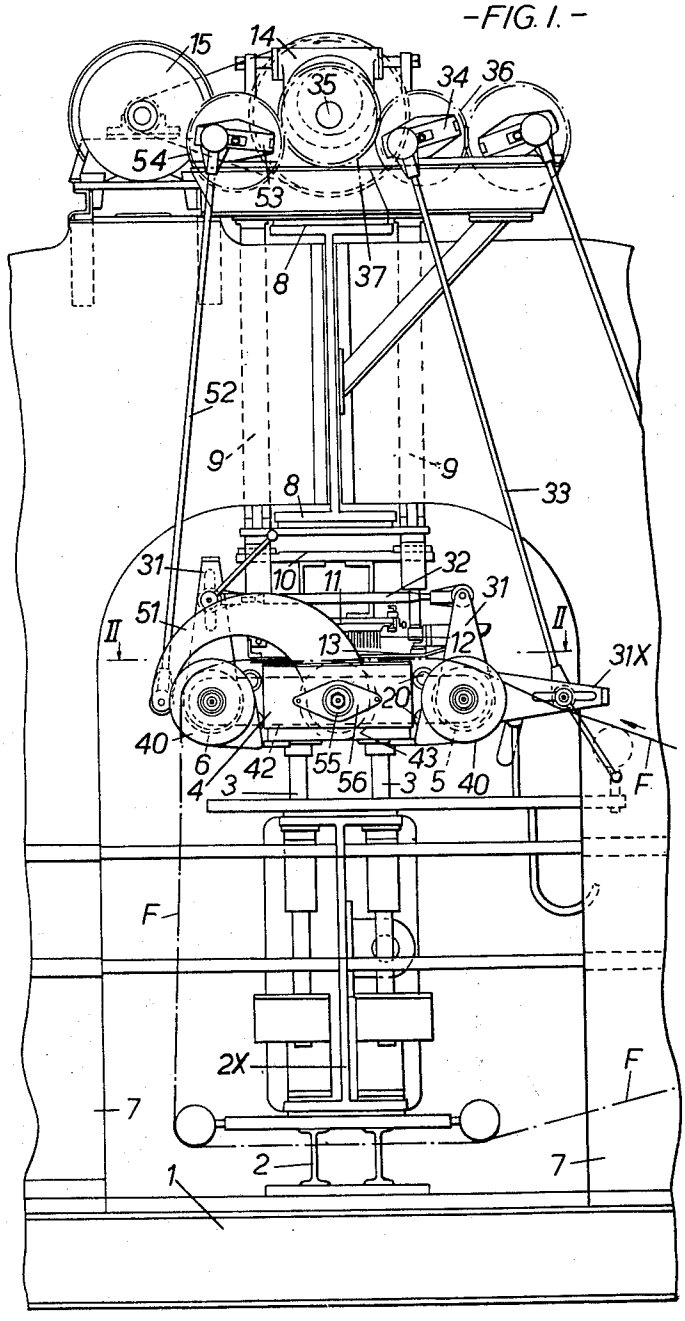
Sept. 29, 1964 B. O'BYRNE 3,150,434

WEB NEEDLING MACHINES

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-FIG. 1.-



INVENTOR:

BRENDAN O'BYRNE

BY

Abraham A. Saffitz

ATTORNEY

Sept. 29, 1964 B. O'BYRNE 3,150,434

WEB NEEDLING MACHINES

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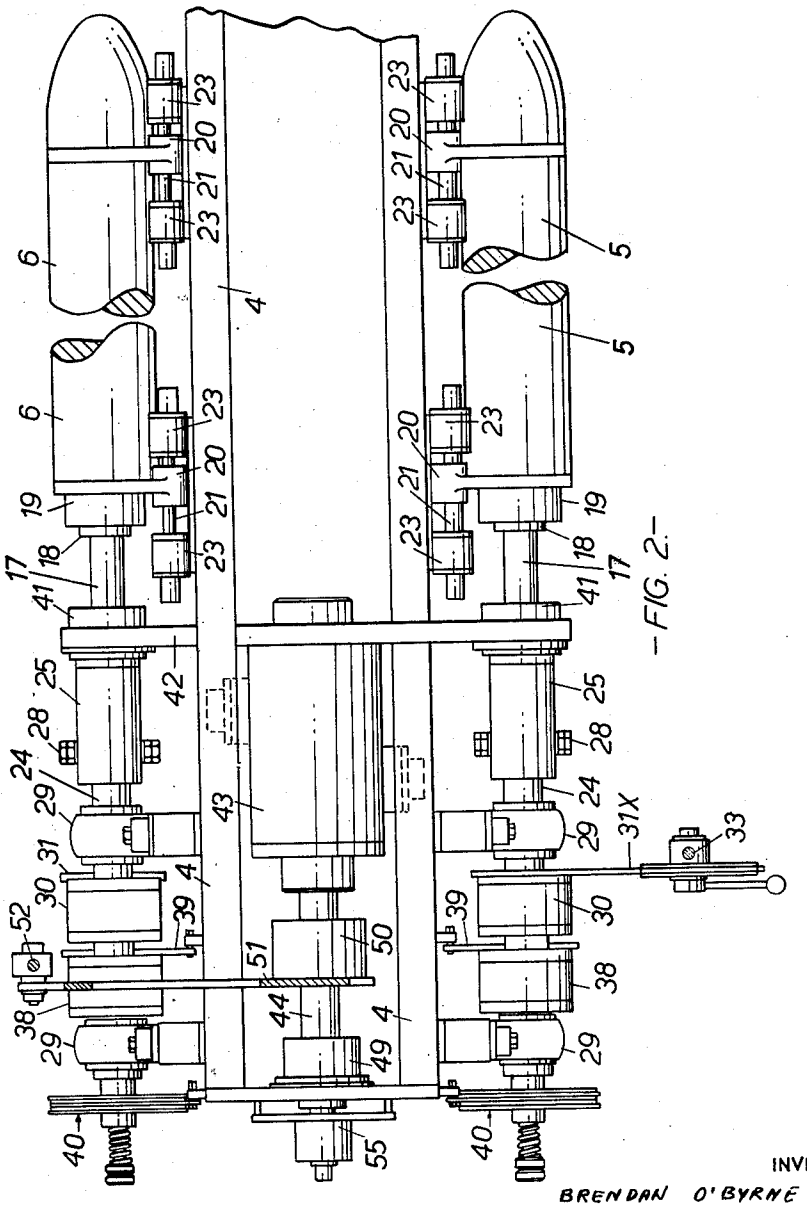


FIG. 2

INVENTOR:
BRENDAN O'BYRNE
BY
Abraham A. Saffitz
ATTORNEY

Sept. 29, 1964 B. O'BYRNE 3,150,434

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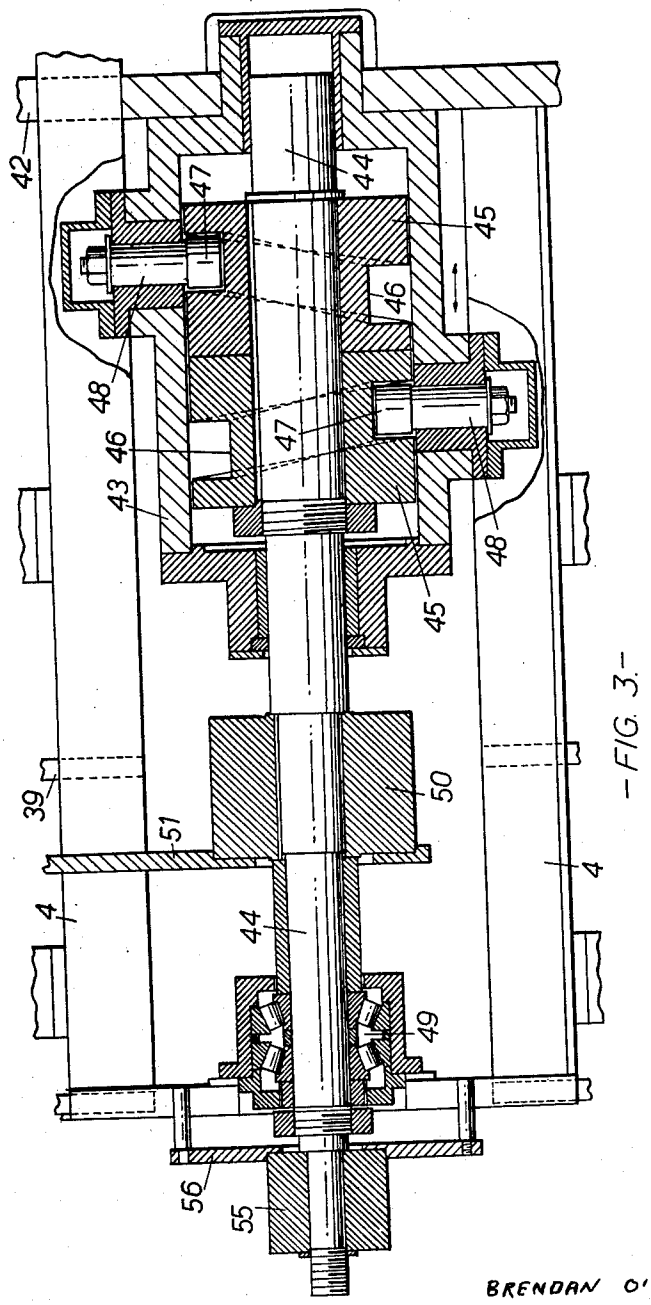


FIG. 3.

INVENTOR:
BRENDAN O'BYRNE
BY
Abraham A. Saffitz
ATTORNEY

Sept. 29, 1964 B. O'BYRNE 3,150,434

WEB NEEDLING MACHINES

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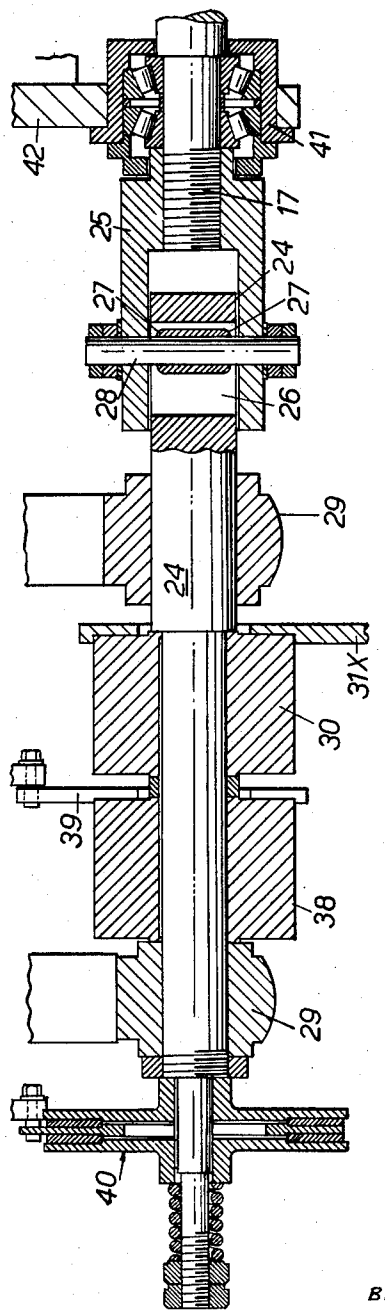


FIG. 4.

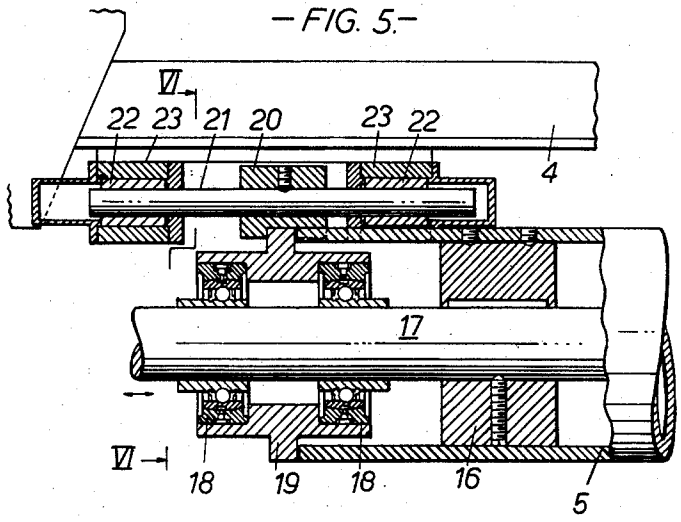
INVENTOR:
BRENDAN O'BYRNE
BY
Abraham A. Saffitz
ATTORNEY

Sept. 29, 1964 B. O'BYRNE 3,150,434

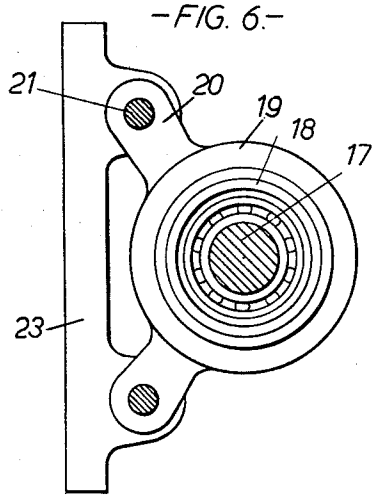
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-FIG. 5.-



-FIG. 6.-



INVENTOR:
BRENDAN O'BYRNE
BY
Abraham A. Saffitz
ATTORNEY

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3,150,434

WEB NEEDLING MACHINES

Brendan O'Byrne, Batley, England, assignor to William Bywater Limited, Leeds, England

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2 Claims. (Cl. 28—4)

This invention relates to web punching or needling machines for treating webs or felts of fibrous material so as to intermingle the fibres.

In such machines of the kind to which this invention relates the material is drawn between a needle bed and the reciprocating needles in a path at right angles to the needle board so that the needle penetrations in the material take the pattern of a series of rows in the direction of travel of the material.

The chief object of the present invention is to improve or make more thorough the needling effect by producing a more haphazard or dispersed pattern of penetrations.

A further object is to provide in such a machine means for producing this more random arrangement of penetrations automatically and without interfering with the normal speed of the needling action or of the travel of the material through the machine.

With these and other objects in view it is proposed according to this invention to provide a machine of the above described kind with means for reciprocating the material in the needling area in directions transverse to the direction of travel of the material. Preferably this reciprocation may be produced in directions at right angles to the direction of travel of the material. This reciprocating movement may be intermittent and in phase with the intermittent movement of the material through the needling area, or it may be continuous in suitable circumstances.

Preferably this reciprocation of the material is produced by reciprocating the means which feed the material to the needling area and/or the means which draw it through such area. Thus the draw roller or rollers may be reciprocated lengthwise of the machine, and in addition or alternatively the feed roller or rollers or the endless travelling feed sheet or sheets as the case may be, may be likewise reciprocated.

For this purpose the rollers and/or sheet will be mounted and driven so as to pass the material through the needling area and also to reciprocate it. These mounting and reciprocating arrangements may vary to suit different machines.

In order that the invention may be clearly understood and readily carried into effect the same will now be more fully described with reference to and by the aid of the accompanying drawings, which illustrate by way of example one embodiment of the invention and in which:

FIGURE 1 is an end elevation, seen from the left-hand side of FIGURE 2, of a needling machine to which the invention is applied;

FIGURE 2 is a horizontal section taken on the line II—II in FIGURE 1, but showing mainly that end of the machine only;

FIGURE 3 is a half plan and half horizontal section to an enlarged scale of the cam shaft assembly shown in FIGURE 2;

FIGURE 4 is a similar view to FIGURE 3 of one of the roller driving shaft assemblies;

FIGURE 5 is a horizontal section through one of the roller shaft supports;

FIGURE 6 is a partial section taken on the line VI—VI in FIGURE 5.

The illustrated machine is generally of known construction having a base 1 which supports a lower girder

structure 2, 2X carrying two rows of jacks 3 on which is mounted a needle bed 4 extending the width of the machine. A feed roller 5 and a draw roller 6 are carried respectively on the front and rear of the needle bed extending the length thereof and are arranged to be rotated intermittently in order to feed the felt F across the needle bed in the direction indicated by the arrows in FIGURE 1, the path of the felt being indicated in that figure.

Arch-shaped end frame plates 7 support an upper girder structure 8 on which are mounted pillars 9 carrying the needle arm 10 and needle board 11 with its needles 12 which operate through the stripper plate 13, the needle board being vertically reciprocated through the pillars by an eccentric mechanism 14 on a main shaft 35 driven by a motor 15, these two latter being mounted upon the girder structure 8.

The construction so far referred to is substantially known and needs no further description, but to enable the rollers 5, 6 to be moved axially to give the lateral traverse or shuffling to the felt F they are mounted as shown in FIGURE 5. Each roller shell is secured to a series of bosses 16 fixed on the roller shaft 17 which is carried in ball bearings 18 in a bearing housing 19, this housing having two arms 20 secured upon rods 21 which are slidably supported in slide bearings 22 whose housings 23 are secured to the side of the needle bed 4. Two or more such mountings are provided for each roller shaft.

Each roller shaft 17 is connected to a roller drive shaft 24 by a sliding coupling as shown in FIGURE 4. This consists of a sleeve 25 screwed upon one end of the shaft 17 and fitting slidably over the adjacent end of the coaxial drive shaft 24 which is diametrically slotted at 26 to accommodate cylindrical bush 27 mounted on a pin 28 secured diametrically across the sleeve 25, whereby the shaft 17 (and with it the roller) can be rotated by the drive shaft 24 but can move axially over a short distance (say up to 1").

Each drive shaft 24 is supported by bearings 29 from the needle bed 4 and arranged to be intermittently rotated through a feed ratchet device 30 having a pawl arm 31, these two arms 31 being connected by a rod 32 and one arm having an auxiliary arm 31X connected by a rod 33 to a crank device 34 driven by gears 36, 37 from the main shaft 35. Each feed ratchet device 30 is associated with a holding ratchet device 38 and pawl arm 39 which prevents reverse rotation of the drive shaft 24, whilst overrunning of the rollers at each feed movement due to the momentum of the parts is prevented by a spring-pressed plate-type friction brake 40. The mechanisms referred to in this paragraph are substantially known and need no further description.

The roller shafts 17 are connected adjacent the sliding couplings by two-way thrust roller bearings 41 to opposite ends of a yoke or bridge piece 42 which is secured at its centre to a cam housing 43. This housing is slidably mounted on a cam shaft 44 on which are keyed two cam rings 45 having cam grooves 46 engaged by runners 47 on pins 48 secured at diametrically opposite sides of the housing. The grooves lie in planes which are oblique to a plane at right angles to the shaft axis and which are oppositely inclined to one another, whereby rotation of the shaft produces a reciprocating movement of the housing (preferably at uniform speed) and therefore of the roller shafts 17 and the rollers 5, 6.

The cam shaft 44 is additionally supported in one end of the needle bed 4 by a two-way thrust roller bearing 49, and is arranged to be intermittently rotated through a traverse ratchet device 50 by a curved pawl arm 51 which is connected by a rod 52 to an adjustable-

throw crank device 53 driven by gears 54, 37 from the main shaft 35. The outer end of shaft 44 carries a holding ratchet device 55 engaged by a pawl arm 56 secured to the end of the needle bed 4 to prevent reverse rotation of the shaft.

By this means an intermittent partial rotation of the cam shaft reciprocates the cam housing and thereby the feed and draw rollers 5, 6 in short steps (say ⅛") over (say) a ½" range. This shuffling or traversing movement takes place when the needles are clear of the felt and conveniently may take place simultaneously with the feed movement of the felt between consecutive needling strokes of the needle board. It will be obvious that the correct timing of these movements can be obtained from the driving gear arrangement, whilst the extent of feed and lateral traverse of the felt can be controlled by adjusting the connections of rod 52 to its crank device, of rod 33 to its crank device and to the arm 31X, and of rod 32 to arm 31.

This small lateral traverse or shuffling movement of the rollers and the felt carried thereby causes successive needling strokes to penetrate the felt with rows or series of penetrations which are out of line with the preceding ones, and thus a more haphazard or more dispersed pattern of penetrations is achieved.

Where endless travelling feed sheets are used instead of the feed roller, the supports for these sheets could likewise be shuffled laterally. It is to be understood that any other suitable form of sliding coupling could be used, and likewise any other suitable form of mechanism for producing the intermittent motion.

Whilst the hereinbefore described embodiments of the invention have been mentioned merely by way of example, it is to be understood that other suitable embodiments may be evolved for carrying out the invention and that protection is hereby claimed for all such embodiments within the scope of the appended claims.

I claim:

1. In a web punching machine, the combination of a needle bed, a reciprocating needle board, defining a needling area over said bed, feed and draw rollers respectively located in front of and behind said needling area, rotatable shafts on which said rollers are drivably mounted, bearing means for said roller shafts which permit also a limited axial movement thereof, bearing means for supporting said driving shafts against axial movement thereof, means for rotating said driving shafts and thereby said rollers intermittently, and means for moving said roller shafts and rollers intermittently widthwise of the machine to reciprocate the material.

2. In a web punching machine, the combination of claim 1 wherein said last mentioned means includes a rotary cam device drivably mounted on a cam shaft which is located parallel to and between said driving shafts, a cam housing suurrounding said cam device and arranged to be reciprocated thereby axially of said cam shaft, a yoke connecting said cam housing to said roller shafts for transmitting said axial reciprocation thereto, and means for rotating said cam shaft intermittently.

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